

NISTTech

Six-Degree of Freedom Micro-Positioner

Accurate three dimensional motion at nanoscale for positioning professionals

Description

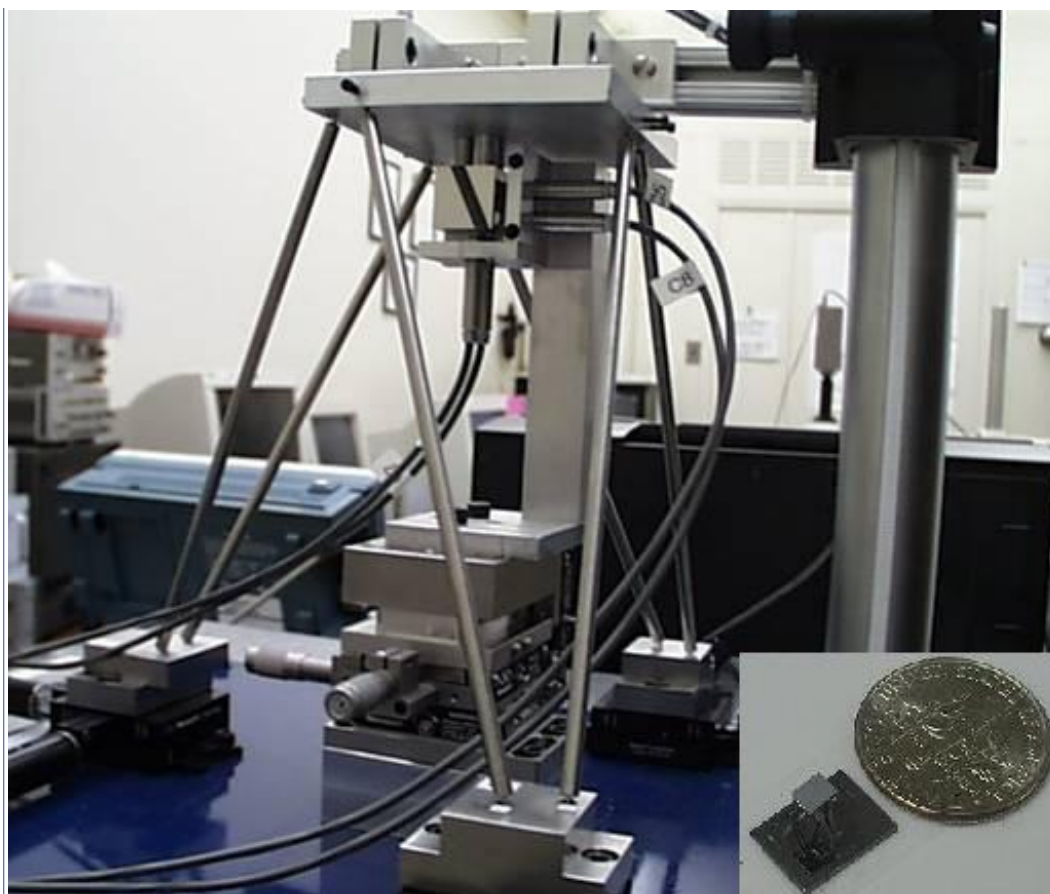
A six degree of freedom three dimensional (3D) space monolithic nanopositioner can be built to any scale and delivers x-y-z linear and angular motions from a fraction of a nanometer to 500 microns. The design makes use of a monolithic hexapod and produces zero backlash and stiction. Benefits of this design include the use of embedded safety steps (door stops) preventing the destruction of the mechanism and sensor assembly if accidentally overloaded. A sensor assembly embedded into the device underneath the payload measures the translational and angular motions about the x-y-z axes.

These devices range in size from the macroscale (300mm x 300mm) to MEMS- scale (1mm x 1mm). Materials used to build these devices include aluminum, steel, and single crystal silicon. Capacitance displacement sensors have been embedded into the devices, and interferometers into the MEMS microscale devices.

Computer Assisted Designs (CAD) drawings and lithography mask designs (for the MEMS devices only) are available. A fully equipped laboratory is available to assist with the testing of the devices.

Note: See U.S. Patent # 6,467,761, Positioning stage, under Citations below.

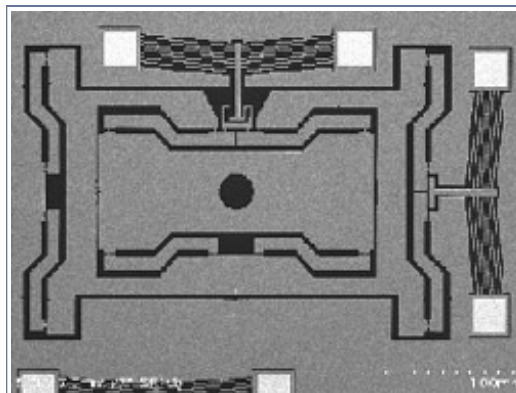
Images



Macro-Scale Positioning Device; (Inset) Micro-Scale Device



Manipulating Micro-Scale Spheres



2 DOF MEMS Nanopositioner

Applications

- **Precision manufacturing**
Useful for manufacturing high-precision motion and metrology equipment.

Advantages

- **Accuracy**
Accurate positioning--precision down to a fraction of a nanometer or 500 microns on the microscale.
- **Various scales**
Positioner available in micro-, meso-, and macro- scales.

Abstract

A positioning device and method for positioning objects is provided. The device includes a movable stage and a pair of levers. The pair of levers is symmetric about a first axis of the movable stage. Additionally, the pair of levers is parallel to a second

axis of the movable stage. This second axis is perpendicular to the first axis. Each of the pair of levers applies a force to the movable stage. Each of the pair of levers moves in an arc. The two levers move in opposite directions along their respective arc. The two arcs are symmetrical about an axis of the movable stage.

Inventors

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Citations

1. U.S. Patent #6,467,761, Positioning stage
2. Precision Meso/Micro Systems for Nanomanufacturing
3. N. G. Dagalakis and E. Amatucci, "Kinematic modeling of a 6 degree of freedom tri-stage micro-positioner," Proceedings of the ASPE Annual Meeting, Crystal City, VA, 2001, pp. 200-203.

Related Items

- MERWYN Business Simulation Report

References

- U.S. Patent #6,484,602 issued 11-26-2002, expires 06/20/2020
- Docket: 99-017/-032/-037US2

Status of Availability

This invention is available for exclusive or non-exclusive commercialization licensing. Collaborative research opportunities are available. NIST has granted a royalty-free non-exclusive research license to this patent.

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